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cytoplasm some process which is symbolized by the pairing of chromosomes in synapsis, and which, owing to differences in the composition of the parental idioplasm, leads to derangement and finally cessation of the metabolism that had previously been carried on successfully. Some such hypothesis is necessary to explain why failure of growth usually begins with germ cell formation, and the necessity is not lessened by the fact that sterility is a purely relative phenomenon produced also by other conditions than hybridization.

TISCHLER agrees with JOST that the increased luxuriance of some hybrids is probably due to a "poisoning" effect of one species on the other. Some of the cases of self-sterility bear a similar interpretation.

Three classes of facts are cited to show that there is not a segregation of characters during reduction in Mendelian hybrids: (1) Cases of vegetative splitting, as in *Syringa correlata* and *Cytisus Adami*. (2) Certain cases of latency or cryptomerism (TSCHERMAK); e. g., the crossing of two white forms having certain other characters gives a violet hybrid. But such cases have been otherwise explained by the Mendelians. (3) Characters mendelize which cannot be represented by distinct portions of the idioplasm. Here are cited annual and biennial races of *Hyoscyamus niger*, immunity and non-immunity to rust in certain grains, and sterility and non-sterility in *Lathyrus*. On the other hand, it might be said that if the chromosomes are unlike, then each must represent some general property of the whole organism, if it represents anything. TISCHLER concludes that in the reduction divisions there is not a true segregation but latescence (*Latentwerden*) of characters. It is questionable whether this is an improvement over the idea of chromosomes or representative particles in the dominant and recessive condition in the germ cells, a hypothesis which will undoubtedly have to be given up. *Drosera rotundifolia* \times *longifolia* produces pollen grains in tetrads, and in some cases two grains of a tetrad have characters belonging to each parent. This indicates a splitting of characters during reduction. But BATESON crossed races of *Lathyrus* having long and round pollen, in which all the F_1 had long pollen and the F_2 gave long:short in the ratio 3:1. From this it appears that it is possible to have Mendelian behavior without segregation of characters during reduction.

The frequent sterility in mutants, accompanied by similar irregularities to those in hybrids during reduction, as the reviewer has shown,⁸ TISCHLER also ascribes to some disturbance of the idioplasm.—R. R. GATES.

Temperature and growth.—Beginners in research will do well to study this paper by BALLS.⁹ It is of a type really too rare. It shows how a keen scientific discernment is alert to appreciate the significance of a casual observation in its bearing upon a fundamental problem. It shows how difficulties may be overcome

⁸ GATES, R. R., Pollen development in hybrids of *Oenothera lutea* \times *O. Lamarckiana*, and its relation to mutation. BOT. GAZETTE 43:81-115. pls. 2-4. 1907.

⁹ BALLS, LAWRENCE W., Temperature and growth. Annals of Botany 22:557-591. 1908.

by ingenuity in devising efficient apparatus and illustrates the potency of logical inquiry. One unfavorable criticism is that the scientific name of the organism is not given. During a study of a pest of the cotton crop in Egypt, the author noted that cultures of this "sore-shin" fungus showed a notable difference between the thermal death-point and the temperature inhibiting growth. This observation suggested an analysis of the temperature factor in its effects upon growth. It is stated that the hyphae of this fungus are morphologically and physiologically equivalent, in that spore-formation, sexual or asexual, does not occur. Of course this statement is not to be taken literally, as it would be very difficult to say that all the hyphae of a given fungus are physiologically equivalent. As a matter of fact, the author himself states that in liquid cultures at 20° C. resting cells are formed in abundance. If the cultures are grown at 34° C. growth ceases (culture becomes stale) much earlier than at lower temperatures. This feature of "staleness" or of discontinued growth was found to be caused by the accumulation of substances which retard and if sufficiently concentrated stop growth. The substance or substances which originate in the organism as a result of the effect of temperature, and whose influence is to inhibit growth, have been isolated from the organism as products of katabolism, though they have not been chemically identified. To such katabolites the provisional name of "X" is given. From a large number of tests whose results are tabulated, illustrated by appropriate curves and verbally discussed, it appears to be demonstrated (a) that with increasing temperature there is a regular acceleration in the rate of growth up to 30° C. and this acceleration approximately fulfils the expectation based upon VAN'T HOFF's law; (b) above 30° C. the growth-rate acceleration decreases as the factor of time becomes limiting; (c) later growth stops at a fairly definite temperature, which the author proposes to call the "stopping point;" (d) the optimum is therefore not a definite temperature but a status of the organism in which the effects of the factors of time and of temperature physiologically balance. As would be expected the style and composition of the paper are consistent with the logical development of the investigation.—RAYMOND H. POND.

Seedlings of conifers.—With the hope of finding facts of phylogenetic importance, HILL and FRANE began, some time ago, a comparative study of the transition region in seedlings. Their preliminary announcement of results was noted in this journal;¹⁰ the first paper of the series has appeared recently.¹¹

The species examined in this part of the work are included in thirteen genera of the Coniferales. Two subfamilies of the Taxaceae are represented, the Podocarpaceae and the Taxineae; and of the Pinaceae two subfamilies, the Taxodineae and the Cupressineae. In all the conifer seedlings examined the authors find the transition to be according to VAN TIEGHEM's type 3 or a modification of it. In all but Podocarpus, which has two, there is only one vascular bundle in each

¹⁰ BOT. GAZETTE 43:77. 1907.

¹¹ HILL, T. G., AND FRANE, E. DE, The seedling structure of gymnosperms. I. *Annals of Botany* 22:689-712. 1908.